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cient to observe what cannot be seen in regard to the very minute swine-plague Schizophytes. Therefore, a little more than what is really known about the latter may almost safely be inferred from analogy. But I will not enter into speculations, and, at any rate, first state what I have seen. Sometimes in perfectly fresh blood serum and in fresh lung-exudation, and almost always in blood serum and lung-exudation 12 to 24 hours old, and also in the mucus and morbid products of a diseased piece of intestine, peculiar-shaped Schizophytes can be found. The same are rod-shaped, but have at one end, or sometimes towards the middle, a very bright granule, which strongly refracts the light, and consequently is more dense than the rest of the bacterium. It is of about the same diameter as the rod itself. This granule is surrounded or enveloped by a zone or ring—possibly a membrane—which is less dense, and much less light-refracting. The whole rod, therefore, if this granule is situated at one end, as is usually the case, presents the shape of a club, or rather that of a short stick with a bright round knob at one end. It is a so-called Helobacterium (Billroth), and the bright and dense or light-refracting granule is a so-called lasting spore (Dauerspore of Billroth).

(To be continued.)

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ON CERTAIN ABORIGINAL IMPLEMENTS FROM NAPA COUNTY, CALIFORNIA.¹

BY ROBERT E. C. STEARNS.

THE figures herewith presented illustrate a collection made by me in October, 1881, on the top of Howell mountain, in Napa county.

The mortars are exteriorly rude unworked stones, generally of much harder quality than most of the country rock in the neighborhood. Fig. 1 is the most symmetrical of the five specimens collected; in this respect it is the least characteristic; otherwise so far as diameter and depth of the concavity are considered, it is a fair type of all.

I was unable to find a single specimen, or even a fragment,

¹Read before the California Academy of Sciences, October 19, 1881.

where the exterior had been shaped. The cavities in all of the

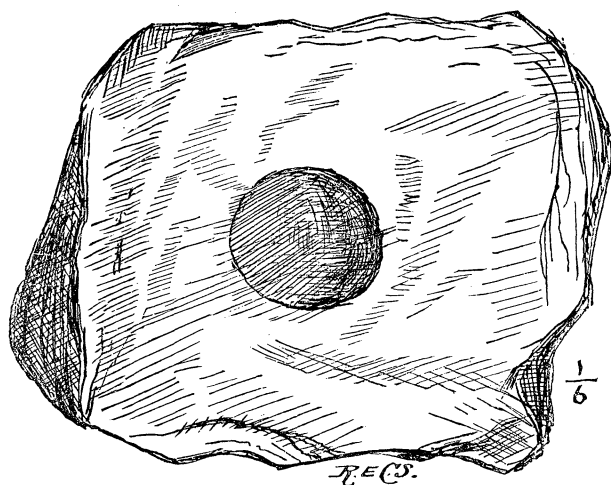


FIG. 1.—California Indian Mortar.

specimens are nearly alike, about four inches in diameter and of the depth of a small saucer.

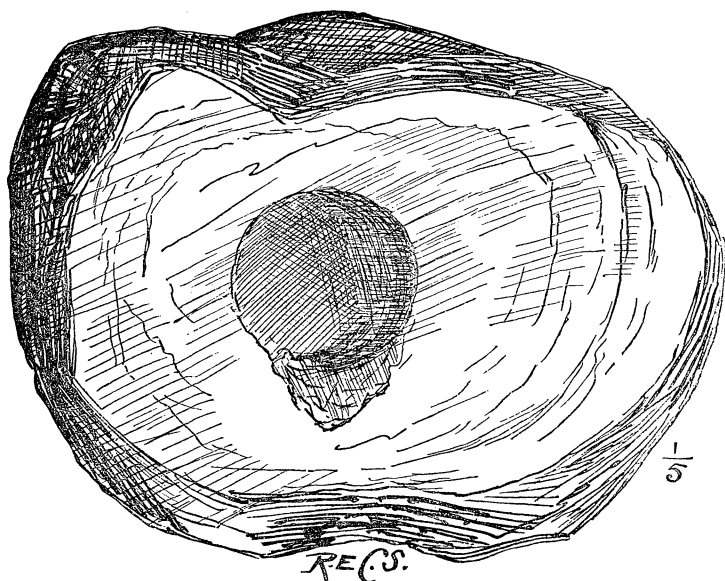


FIG. 2.—Typical Indian Mortar.

The foregoing figure (2) is a fairly typical specimen of this class of mortars. It was found in nearly the same locality as the subject of the preceding figure.

It is not probable that such shallow mortars were used for the pulverization of acorns or pine-nuts, or any other of the principal articles which constituted the bulk of the aboriginal cuisine.

This supposition is further supported by the fact of the great number of mortar holes which may be seen in the outcroppings of the permanent or fixed rocks in the immediate neighborhood.

The territory from which the material under review was obtained, embraces an area of some two hundred acres; for the greater part a fertile intervalle or small valley surrounded by hilly ground which merges by moderately inclined or gentle slopes into the general level. This intervalle is about a mile in length, if measured between the extreme points, though probably not one-fourth of a mile in width at the widest place. When the present owner purchased it, it was for the most part a willow swale about midway of its length; where on the easterly side the slope descends to the intervalle, are several perpetual, running springs of most excellent water. These springs are only a few rods apart. In convenient proximity outcroppings of volcanic pudding-stone occur, which are full of mortar-holes of various sizes, from four inches in diameter and depth to twelve inches in diameter and depth. None of the mortar-holes in the fixed rocks are as shallow as those in the portable mortars figured above from which we may infer that these latter were used for some special rather than for general purposes, perhaps for the grinding of paint or medicine, while the fixed mortars were used for general purposes like the pounding of acorns, nuts, &c., &c. Of these latter it is often the case that the larger holes are united at the top and for an inch or more down, through close proximity and abrasion, through constant use the intervening wall or side at the top breaking through. As the springs are more numerous and better situated at this middle station, which by way of distinction may be called station A, so also are the mortar holes more numerous, though the latter are also met with at or near the extreme points or ends of the intervalle, which runs in a general way northerly and southerly. The northerly point may be indicated as station B, and the southerly as station C.

Pestles were collected at all of these stations. Some are hardly more than symmetrical cobble-stones, while others are of the usual pestle-form. None of them are nicely finished, and like the mortars are exceedingly simple and rude.

The nearness of the outcropping country-rock to the springs and to the chief articles of food, operated, quite likely, to prevent that degree of development in stone working which is found in such implements among the relics of nearly related and geographically approximate tribes.

There was no imperative necessity, nor anything to be gained by the careful and laborious finishing of portable mortars where the material requiring trituration was abundant and close at hand, making a permanent settlement possible, where otherwise only a temporary camp could be made, dependent for duration upon the extent of the mast or nut-harvest or acorn-crop.

The mortars herewith figured, with, as before remarked, only the capacity of a common saucer, are in stones which weigh from *thirty* to *fifty pounds*. If these had belonged to a tribe within whose domain the acorn and nut-bearing trees were widely scattered, and thereby compelled to be more roving in their habits than the tribe which inhabited the region herein described, the mortars would probably have been smaller in bulk and consequently lighter in weight. To perpetrate a hibernicism, a *portable* acorn mortar of corresponding size and weight as related to capacity, *would not be portable*. Where the food conditions are as above indicated, the mill would of necessity have to be carried to the grist, instead of the grist to the mill; this would compel the carrying of pulverizing implements, and lead not only to a reduction in the weight of such utensils, through finishing the exterior by cutting away every superfluous pound of stone, but also to the careful selection of pieces of stones or cobbles of a more compact and solid quality, so as to combine the greatest strength with the least weight.

This also explains why mortars and pestles are so frequently met with in places near which the evidences of an aboriginal camp or settlement do not exist.

That the tribe which inhabited this Howell mountain locality were not as expert in this class of stone working as those even of the not distant Calistoga and Knight's valley region, the Ash-ochi-mis, or Wattos, is proven by the mortars collected by me at the last named place in August, 1879; for though the lot of half a dozen included one specimen hollowed in a rough stone, of the same general type as those figured in this paper, it also embraced specimens worked in well selected cobbles, and one hollowed in end of a section of a basaltic column. This latter as well as the

rough-stone one of the Knight's valley collection, are in the Museum of the University of California.

Obsidian in pieces and chips are abundant at each of the stations, though more so at A than the others. The number of arrow-heads, and fragments of arrow-heads, collected principally at A, numbered about two hundred, of which one-third were found by my companion, Mr. A. L. Roach, of Indianapolis. A few were obtained by other parties. With occasional exceptions, the arrow-heads were in the rough stage of manufacture, awaiting critical selection and finishing by experts in this line, probably the veteran Nimrods of the tribe.

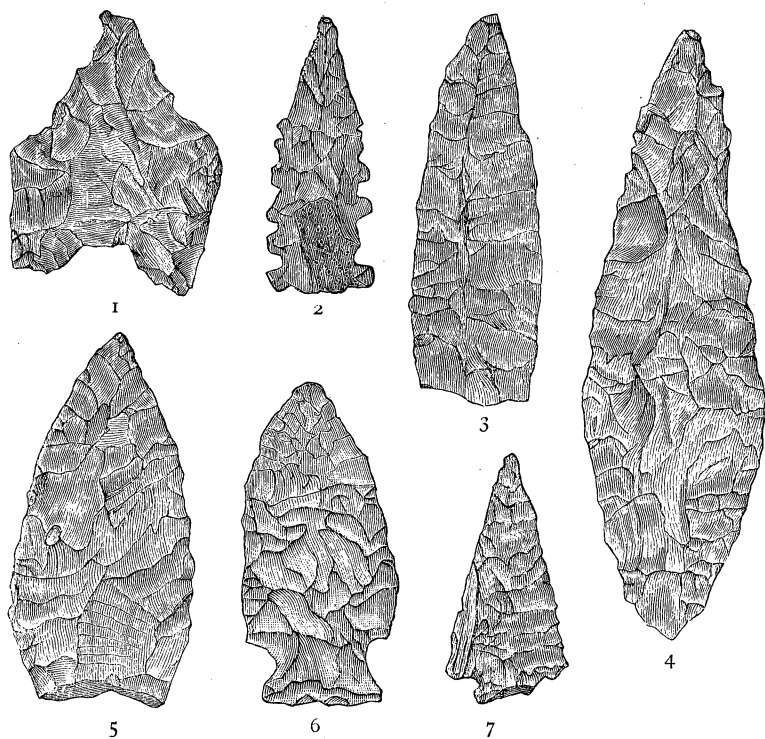


FIG. 3.—Arrow-heads of Obsidian, California.

Obsidian appears to have been the only material used by the ancient arrow-makers of this region; none other was detected among the débris or remains of their long abandoned workshops.

On the opposite side of Napa valley, in a hill not far from the town of St. Helena, obsidian is found in great abundance, and it is probable that from that locality the supply was obtained. About one-third of the arrow-heads were found at station B; the forms of these are shown in the above figures.

Of number one but two specimens were found ; number two is another exceedingly rare form, of which the specimen figured is the most perfect, only three or four fragments of this, in addition to that figured, were detected. Mr. Roach obtained a single specimen rather more complete than the above. This form, which is scarcely met with in most California collections, presents the very highest skill in arrow-making art. Number three is perhaps the most abundant form, while four, five and six are numerous ; seven is also seldom met with, and is very delicately and nicely worked.

A single bead was detected by Mr. Roach at station C. At this southerly station the mortar (Fig. 1) was found.

The general region herein referred to must have been a paradise to the red man, so far as his needs and aboriginal comfort are concerned. Acorns of several species of oaks, pine nuts, hazel nuts and manzanita berries were probably as abundant in former times as now; and it is altogether probable that game of all kinds was far more abundant than at the present day ; in fact all of the requisites for the sustentation of a numerous aboriginal population.

If the community which existed here was at all possessed of æsthetic perceptions, the scenery must have added largely to the other attractions of the place.

As to the particular tribe which constituted that community, I have been unable to learn.

Since this mountain valley became the property of the present owner, I was informed by his wife, that a few years ago there came along, one day, an old Indian, who told her that when he was a boy he lived here with his tribe, and he had now come back to see once again the place where his childhood was passed. " He went up and away over the hills."

Stephen Powers,¹ in his "Contributions to North American Ethnology," places this region within the geographical area of the Wintuns, one of the great groups of Northern Californian Indians, which included numerous tribes. I would particularly call the attention of all interested in this line of inquiry, to this important and interesting volume.

The nearest adjacent tribes were the Napas, the Caymuses, the Calajomanas, the Mayacommas, the Ulucas and the Mutistals.²

¹ U. S. Geog. and Geol. Survey, Powell, Vol. III, text and map.

² Bancroft's Native Races of the Pacific States, Vol. I, p. 363.

Howell mountain as well as the country beyond, known as Pope's valley, form a region full of attractions for the lover of nature, whether a devotee of science or art. The mountain has an elevation variously stated at from 1500 to 1800 feet above the sea; from favorable points a magnificent panorama is presented, extending to Mt. Diablo in the south, and covering the whole valley of Napa and the westerly mountain ranges which fence in the pleasant valleys between their ridges. The atmosphere is full of health, and the scenery full of inspiration. On every hand, at every turn of the road, right or left, are pictures full of beauty, refreshing to the soul and delightful to the eye. Towering pines, often two hundred feet in height, the Douglass spruce, full of grace and beauty when young, and standing grim, valiant and erect with outstretched and sometimes naked arms when old—as if prepared to wrestle with the storm; sturdy madronas with broadly buttressed bases holding firm to earth, with clean-barked branches widespreading to the sky; noble oaks whose port and bearing are full of stately grandeur. These form but a part of the sylvan deities in whose majestic presence adoration mingles with admiration; these and humbler forms of vegetation, with rock and earth and mountain, are the elements here combined in picturesque harmony, a perpetual feast of beauty, changing only in the morning and evening to put on new splendor in the changing light, and revealing new graces and fresh charms of color and of form. Amid such scenes the California red man, indigenous and to the region born, lived, roamed, hunted and passed away, to be followed by paler faces of exotic lineage, who travel over the long unused and obscure trail, seeking among the chips and stones abandoned by the way, the story of those who made them.

Lack of time prevented investigations elsewhere than at Howell mountain; Angroin's farm is a good point for a base, as well as for recreation, and here more might be done. Pope valley, just over the ridge, should also be explored. It offers great inducements to the ethnologist, the artist and all others who love nature, or who seek for release or rest away from the tumult of traffic and the town.